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FORM PTO-1390 (Modified) (REV 11-98) U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER	U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR)
000393	09/582307

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/EP99/08099	27 October 1999	31 October 1998

TITLE OF INVENTION
Blower for a Vacuum Cleaner

APPLICANT(S) FOR DO/EO/US
Esch et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
   a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ Certificate of Mailing by Express Mail
20. ☒ Other items or information:

a Post Card Receipt
check No. 5464

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR)	INTERNATIONAL APPLICATION NO.	ATTORNEY'S DOCKET NUMBER
09/582307	PCT/EP99/08099	000393

21. The following fees are submitted:.

BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :

		CALCULATIONS PTO USE ONLY
☐	Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2) paid to USPTO and International Search Report not prepared by the EPO or JPO	**$970.00**
☒	International preliminary examination fee (37 CFR 1.482) not paid to USPTO but Internation Search Report prepared by the EPO or JPO	**$840.00**
☐	International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO	**$690.00**
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4)	**$670.00**
☐	International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4)	**$96.00**

ENTER APPROPRIATE BASIC FEE AMOUNT =		**$840.00**
Surcharge of **$130.00** for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (e)).		**$0.00**

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	26 - 20 =	6	x $18.00	**$108.00**
Independent claims	1 - 3 =	0	x $78.00	**$0.00**
Multiple Dependent Claims **(check if applicable)**.			☐	**$0.00**
TOTAL OF ABOVE CALCULATIONS =				**$948.00**
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) **(check if applicable)**.			☐	**$0.00**
SUBTOTAL =				**$948.00**
Processing fee of **$130.00** for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492 (f)). +				**$0.00**
TOTAL NATIONAL FEE =				**$948.00**
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) **(check if applicable).**			☒	**$40.00**
TOTAL FEES ENCLOSED =				**$988.00**
			Amount to be: refunded	$
			charged	$

☒ A check in the amount of **$988.00** to cover the above fees is enclosed.

☐ Please charge my Deposit Account No. in the amount of to cover the above fees.
A duplicate copy of this sheet is enclosed.

☐ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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86 Sparks Street
Cambridge, MA 02138-2216

Tel.: (617)-491-8867

SIGNATURE

Karl Hormann
NAME

26,470
REGISTRATION NUMBER

21 June 2000
DATE

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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

International Application No.: PCT/EP99/08099
International Filing Date: 27 October 1999
Inventors: Esch et al.
For: Blower for a Vacuum Cleaner

86 Sparks Street
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21 June 2000

Hon.
Assistant Commissioner for Patents
Washington, DC 20231

Box PCT

Preliminary Amendment Prior to Claims Fee Calculation

Sir:

With a view to putting the English translation of their subject International Application into a condition believed to comply with formal requirements of U.S. Patent Prosecution and to avoiding fees for multiple dependency claims, Applicants courteously request entry of the following amendment:

In the Specification:

Page 1, line 4: insert --BACKGROUND OF THE INVENTION.

1. Field of the Invention.--;

line 12: insert --2. The State of the Prior Art.--;

page 2, line 9: insert --OBJECT OF THE INVENTION.--;

line 16: insert --SUMMARY OF THE INVENTION.--;

page 3, line 8: insert --DESCRIPTION OF THE SEVERAL DRAWINGS.--;

page 4, line 3: insert --DESCRIPTION OF EMBODIMENT.--;

page 9, line 1: change "Patent Claims" to --What is claimed is:--;

page 15, line 4: change "Abstract" to --ABSTRACT OF THE DISCLOSURE.--; and

page 15, line 6: cancel.

In the claims:

Claim 1, line 1: change "Vacuum" to --The vacuum--;

claim 2, line 1: change "Vacuum" to --The vacuum--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 3, line 1: change "Vacuum" to --The vacuum-- and cancel "1 and";

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 4, line 1: change "Vacuum" to --The vacuum-- and cancel "1 to";

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 5, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to 4" to --claim 1--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 6, line 1: change "Vacuum" to --The vacuum-- and cancel "1 and";

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 7, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to" to --claim--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 8, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to" to --claim--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 9, line 1: change "Vacuum" to --The vacuum-- and "one or more of

claims 1 to 8" to --claim 1--;

claim 9, line 2: cancel; and

line 3: change "that the" to --wherein--;

claim 10, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to" to --claim 7--;

line 2: cancel; and

line 3: change "that" to --wherein-- and "the" (first occurrence) to --an--;

claim 11, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to" to --claim--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 12, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to" to --claim--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 13, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to 12" to --claim 7--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 14, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to 13" to --claim 10--;

line 2: cancel: and

line 3: change "that" to --wherein--;

claim 15, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to 14" to --claim 10--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 16, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to-- to --claim--;

claim 16, line 2: cancel; and

line 3: change "that" to --wherein--;

claim 17, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to 16" to --claim 2--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 18, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to 17" to --claim 1--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 19, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to" to --claim--;

line 2: cancel"; and

line 3: change "that" to --wherein--;

claim 20, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to 19" to --claim 18--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 21, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to" to --claim--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 22, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to" to --claim--;

line 2: cancel; and

line 3: change "that" to --wherein-- and "pieces" to --guides--;

claim 23, line 1: change "Vacuum" to --The vacuum" and "one or more of claims 1 to 22" to --claim 1--;

line 2: cancel; and

claim 23, line 3: change "that" to --wherein-- and cancel "wound";

claim 24, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to 23" to --claim 1--;

line 2: cancel; and

line 3: change "that" to --wherein--;

claim 25, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to 24" to --claim 1;

line 2: cancel; and

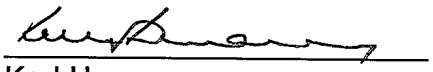
line 3: change "that" to --wherein--;

claim 26, line 1: change "Vacuum" to --The vacuum-- and "one or more of claims 1 to 25" to --claim 1--;

line 2: cancel; and

line 3: change "that" to --wherein--.

Respectfully submitted,



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6/PRTS

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Blower for a Vacuum Cleaner

The subject of the invention relates to a blower for a vacuum cleaner consisting of an electric drive motor and a support cage for receiving structural modules of the drive motor, such as stator pack, rotor and brush holder with carbon brushes as well as an at least single stage blower unit driven by the motor and having a deflector, an impeller and suction hood, the deflector being at the same time structured as a lid for the support cage and providing a bearing seat for the rotor.

A vacuum cleaner blower of this type is known, for instance, from German patent specification DE-AS 15 63 028.

The prior art device is provided with a support cage made of an insulating material for receiving structural electrical modules of the motor, such as stator pack, rotor and brush holder for carbon brushes, and, at its bottom, with a bearing seat for the bearing of one of the two rotor bearings. Laterally of the rotor bearing the support cage is provided with two brush holders for the collector carbon brushes. In the wall of the housing or cage there are also provided recesses for directly receiving electrical connectors. The open side of the support cage facing the blower is structured as a centering rim for a deflector enclosing the support cage and supporting a second rotor bearing. In this support cage, the brush holders provided in the lower section of the housing and the plastic support cage form an integral unit. However, the carbon brushes of the rotor aligned transversely of the vertical axis of the support cage have to connected, as well as inserted, from the outside. Accordingly, the assembly of the known suction blower suffers from the drawback that during assembly of the suction blower the insertion and connecting devices have to be changed several times. Accordingly, it is

not possible to realize a cost-efficient and fully automatic simple fabrication and blower assembly process. Thus, in the prior art the necessary securing of the stator pack by means of screws inserted through the support cage wall necessitates a change in direction during assembly such that the required assembly tool has to be withdrawn to the outside before the rotor can thereafter be inserted into the support cage in the preferred assembly orientation and direction of mounting. The same drawback exists in connection with the assembly and connection of the carbon brushes.

It is an object of the invention so to structure a support cage so as to enable a simple cost-efficient assembly of the various structural modules of the suction blower without changes in the mounting direction and automatic contacting of the electrical connections of the motor, such as carbon brushes, winding connectors, etc., during assembly of the structural modules in the support cage.

The object is accomplished by the characteristics defined in patent claim 1. Advantageous embodiments and improvements of the invention are set forth in the ensuing sub-claims.

The essential advantage obtained by the invention is that for finalizing the suction blower in a preferred assembly and mounting direction, all essential structural modules required for the operation of the electric motor aggregate, such as stator assembly, rotor, rotor bearing as well as brush holder with carbon brushes, may be automatically and successively inserted from the upper side of the support cage, and secured in their proper orientation, within the support cage, without additional fasteners. During assembly, without changing the assembly direction, the electrical connections of the stator and the rotating rotor are contacted directly by way of the carbon brushes. The inventive structure of the support cage for arranging and accommodating the brush holders of the carbon brushes near the upper side

of the cage facing the deflector as well as the special configuration of the support cage for the stator with connectors and the electrical contacts facilitate the advantageous simple assembly of the suction blower. Moreover, as distinguished from the prior art, it is also possible to arrange electrical components necessary for protecting the windings and/or motor in the support cage. The motor may also be equipped with electronic components in the preferred assembly and mounting direction, simply and automatically.

An embodiment of the invention is schematically depicted in the and will be described in greater detail hereinafter. In the drawings:

Figure 1 is a perspective view of a suction blower for a vacuum cleaner;

Figure 2 is an exploded view of the structural modules of the suction blower in the sequence of their assembly;

Figure 3 is a perspective view of a support cage of the suction blower;

Figure 4 is a perspective view of the support cage with the stator assembly, rotor and brush holder with carbon brushes mounted therein;

Figure 5 is a perspective view of the support cage with the deflector of the blower unit mounted therein;

Figure 6 is a top elevation of the support cage with a separate receptacle on the support cage for an adaptor housing for receiving a circuit board including electrical components for the drive motor of the suction blower;

Figure 7 is a front elevation of the support cage including the adaptor housing and circuit board arranged, in the assembly direction, above the receptacle;

Figure 8 is a top elevation of the support cage corresponding to Fig. 6 with the inserted adaptor housing;

Figure 9 is a perspective view from below of the support cage;

Figure 10 is a side elevation of a circuit board equipped with electrical

components, for the adaptor housing; and

Figure 11 is a view, in longitudinal section, of the adaptor housing.

In Fig. 1, 1 denotes a suction blower for a vacuum cleaner (not shown), the aggregate consisting of an electric drive motor 2 and a blower unit 3 driven by the motor. The blower unit 3 is covered by a suction hood 4 provided with a suction opening 5 for the flow of suction air. The sucked in air permeated the drive motor 2 and exits at the rear of the motor from a support cage 10. As shown in Fig. 2, the support cage 10 receives the known structural modules of the drive motor 2, such a wound stator assembly 6, a rotor 7 and brush holders 8 with carbon brushes 9. The blower unit 3 is of the single stage type and consists of a deflector 11 provided below the suction hood 4, and an impeller 12. The deflector 11 also serves as a cover for the drive motor 2 in the support cage and is provided with a bearing or bearing seat 13 (side B of the support cage) for the rotor 7. The other bearing seat 14 for the rotor 7 is provided in the bottom 15 of the support cage 10 (see Figs. 1, 2, 5) defined as side A of the support cage. In the embodiment shown, the bearing seat 14 is arranged in a cruciform bracket 23 formed in the bottom 15 of the support cage for realizing the exits for the suction air flowing through the motor. Of course, the cruciform structure of the bracket is not mandatory. Any other structure may be provided as suction air exits, such as an enclosed cage bottom provided with laterally formed air slots.

Fig. 2 is an exploded view of the structural modules of the suction blower 1 in the sequence of their assembly. To this end, the support cage 10 is structured, in accordance with the invention, for a mounting direction (arrow C) of its structural modules in the axial direction of the aggregate, as well as for direct contacting. To this end, the brush holders 8 of the carbon brushes 9 are provided adjacent to the upper side B of the support cage which faces the deflector 11.

At its side facing the deflector 11 the support cage 10 is formed to have an outwardly flared rim. The flared rim 16 is provided with receptacles 17 which are open in an upward direction and in the direction of the support cage 10 (see Figs. 2 to 5), into which the brush holder 8 of the carbon brushes 9 may be placed from above. Furthermore, opening 18 are provided in the rim 16 (Figs. 2 to 4) and extending into the wall 19 of the support cage 10. This structure allows insertion from above into the support cage 10 of the stator assembly 6 as well with its connections 20 extending beyond the support cage wall 19 and in contact with the control electronics (not shown) of the motor. Insertion of the brush holder 8, by direct contact of the brush holder contact pins 21 (Fig. 4) with the stator contacts 20, provides an electric connection between the rotor 7 and the stator.

Following assembly of the structural components of the drive motor, the support cage 10 is closed and centered by, and screwed to, the deflector 11 serving also as a lid or bearing shield for the second rotor bearing. For aligning the support cage 10 and the deflector 11 relative to each other one or more centering guides 22 which positively engage each other, are respectively formed in the flared rim 16 of the support cage 10 and in the marginal area of the underside of the deflector 11. The centering guides 22 may be pins, profiled protrusions, bores or the like.

It is of particular advantage to form the centering guides 22 with a profile, for instance a U-shaped profile, as shown in Figs. 2 and 5, which fits precisely into the receptacles 17 of the brush holders 8 in the support cage 10. On the one hand, this causes the deflector 11 to be precisely centered during assembly of he suction blower 1 and, on the other hand, the brush holders 8 and carbon brushes 9 a securely set to allow for an optimum direct contact. Such centering guides 22 additionally serving as hold downs for the carbon brushes 9 eliminate the need for screwed connections and simplify the assembly operation.

As shown in Figs.3 and 4, support braces 24 or receptacles 25 complementing the contour of the stator assembly 6 are integrally formed in the support cage 10 for securely receiving and supporting the stator. The cruciform bracket 23 at the bottom 15 of the support cage formed by the air vents in the wall 19 of the support cage is provided with the second rotor bearing 14. The support cage 10 and the deflector 11 as supports for the rotor bearings are made of a non-conductive material, in particular a plastic. The insulating plastic allows mounting of the electrically conductive brush holders 8 without additional measures of insulation.

As shown in Fig. 2 assembly of the suction blower 1 is carried out from above in the preferred direction C of mounting. As it requires no change in direction, the assembly may be carried out fully automatically. The arrow marks the direction in which the individual structural modules of the blower are successively put together in individual assembly steps. Initially, a ball bearing balancing disk (not shown) is assembled into the bearing seat 14 in the bottom 15 of the support cage 10. Thereafter, the stator assembly 6 is inserted into the cage, and it is centered and secured therein by the support abutments (Fig. 3) as well as by the interior shape of the support cage 10 conforming in its contour to the stator assembly 6. After insertion of the wound stator assembly 6, the rotor is inserted followed by the mounting of the brush holders 8 and its carbon brushes 9. During their placement, the carbon brushes 8 insulated in their receptacles 17 of the plastic support cage 10 directly contact the connectors 20 of the stator pack by way of their brush holder connector contacts 21. Accordingly, the electrical connection between the rotor 7 and the stator is established as soon as the brush holder 8 are inserted. Thereafter, the deflector 11 is mounted as the closing element of the support cage 10 and is secured to the support cage 10 be a screw connection 28. The deflector 11 is affixed to the flared rim 16 in a centered orientation. This connection causes the structural modules of the drive motor 2 to be centered automatically and secured within the cage ensuring, at the

same time, the direct contact. During its assembly, the deflector 11 and its integrated bearing seat 13 receives the second rotor bearing. Thereafter, mounting takes place of the impeller 12 and of the suction hood which, secured to the support cage 10 encloses the blower unit 3 toward the exterior. Even during this assembly operation, the direction C of mounting, Fig. 2, in the axial direction of the suction blower 1 can be maintained.

Electric components for switching, control and/or safety features needed for the suction blower drive motor 2 may be advantageously arranged within the support cage 10 as a result of the special structure of the support cage 10. At least one further receptacle 27 (see Figs. 6 to 9) is provided in the flared rim 16 of the support cage 10 for receiving electric components 28. The electric components are arrange on a circuit board 29 or platen which preferably also supports the connection pins 30a, 30b for direct connections (see Fig. 10).

During assembly, the circuit board 29 is inserted separately into the receptacle 27 or, as provided in the embodiment, such a circuit board 29 is inserted into a separate adaptor housing 31 (see Figs. 7, 8, 11) which is then inserted into the receptacle 27. At its bottom, the receptacle 27 formed in the wall of the support cage (Fig. 9) is provided with a socket 32 for an external connection to a net. The socket opening 32 extends the wall 19 of the support cage 10 in an axial direction.

The adaptor housing and complementing circuit board 29, or the circuit board as such, is provided with the mentioned connector pins 30a, 30b which, for establishing a direct contact, are disposed in an axial direction of the support cage 10. The connector pins 30a, 30b are preferably mounted on the circuit board 29. Following assembly of the blower, the connector pins 30b are needed for a connection with the external net socket connection.

When mounting the adaptor (mounting direction C) first contact pins

30a of the adaptor housing 31 or of the circuit board 29 will connect to associated contacts 20 of the stator pack. The remaining connector pins 30b for external net connection extend freely into the socket opening 32. Preferably, mounting of the adaptor housing 31 and associated circuit board 29 preferably takes place after insertion of the stator 6 into the support cage 10.

The adaptor housing 31 and the electric components 28 on the circuit board 29 may be fitted positively into the receptacle 27. In the simplest case, the electrical components 28 on the circuit board 29 include a decoupling capacitor for the suction blower drive motor 2 as well as a thermal switch for the protection of the windings and/or motor. It is also possible optionally to provide electric power switches, or to arrange them in an addition receptacle.

As shown in Figs. 8 and 11, their is provided at the adaptor housing 31 a hold down bracket 33 for the stator assembly 6 which as shown in Fig. 8 holds down and secured the assembled stator pack 6 once the deflector 11 has been mounted. Thus, the stator pack 6 is secured from above against axial displacement by its engagement with the adaptor. As shown in Fig. 11, the adaptor housing 31 consists of a lower housing portion 31a for receiving the circuit board 29 and a lid portion 31b pivotally connected to the lower housing portion 31a. When the adaptor is mounted the lid portion 31b is flush with the flared rim 16 and positively seated in the receptacle 27. The lid portion 31b is connected to the lower housing portion 31a by a flexible joint.

The preferred direction for fully automatically assembling and mounting the suction blower may be maintained even for the adaption of the support cage to electrical components required for the protection of the windings or the motor.

Patent Claims

1. Vacuum cleaner blower (1) consisting of an electric drive motor (2) with a support cage (10) for receiving of the structural modules of the drive motor (2), such as stator pack (6), rotor (7) and brush holder (8) with carbon brushes (9) as well as an at least single stage blower unit driven by the motor and having a deflector (11), impeller (12) and suction hood (7), the deflector (11) being at the same time structured as a support cage cover with a bearing seat for the rotor (7), characterized by the fact
the support cage (10) is structured for mounting its structural modules in a direction extending axially of the blower as well as for direct contacting, the brush holders 8 of the carbon brushes 9 being provided in the area of the upper side (B) of the support cage which also faces the deflector (11).

2. Vacuum cleaner blower of claim 1,
characterized by the fact
that at its side facing the deflector (11) the support cage (10) is provided with a rim extending beyond the cage, that the flared rim (16) is provided with receptacles (17;27) at least for the brush holders (8) of the carbon brushes (9) and formed into it and open upwardly and towards the interior of the support cage (10) (16).

3. Vacuum cleaner blower of claim 1 and 2,
characterized by the fact
that openings (18) in the flared rim (16) of the support cage (10) extend into the wall (19) of the cage (10) for receiving protruding stator pack connectors (20).

4. Vacuum cleaner blower of one or more of claims 1 to 3,

characterized by the fact
that the stator pack connectors (20) are directly contacted by the carbon brushes (9).

5. Vacuum cleaner blower of one or more of claims 1 to 4, characterized by the fact that the brush holders (8) of the carbon brushes (9) are provided with brush holder connector pins (21) extending in the axial direction of the support cage (10) which contact the associated stator pack connectors (20) during placement of the carbon brushes (9) into the receptacles (17).

6. Vacuum cleaner blower of claim 1 and 2, characterized by the fact that at least one further receptacle (27) is formed in the flared rim (16) of the support cage (10) for receiving a plug-in component group consisting of electrical components (28) for switching, control and/or safety functions of the suction blower drive motor (2).

7. Vacuum cleaner blower of one or more of claims 1 to 6, characterized by the fact that the electrical components (28) are arranged on a circuit board (29) insertable into the receptacle (27) and that during insertion of the circuit board (29) the stator pack connectors (20) are connected with it directly.

8. Vacuum cleaner blower of one or more of claims 1 to 7, characterized by the fact that the circuit board (29) is placed into an adaptor housing (31) which may be separately into the receptacle (27).

9. Vacuum cleaner blower of one or more of claims 1 to 8, characterized by the fact that the at its bottom side the receptacle (27) is provided with a socket opening (32) penetrating through the wall (19) of the support cage (10) for an external plug-in connection.

10. Vacuum cleaner blower of one or more of claims 1 to 9, characterized by the fact that that the adaptor housing (31) with completed circuit board (29) or the circuit board (29) itself is provided with connector pins (30a; 30b) extending in the axial direction of the support cage (10) for direct contacting.

11. Vacuum cleaner blower of one or more of claims 1 to 10, characterized by the fact that the connector pins (30a) of the adaptor housing (31) or of the circuit board 29 during insertion into the receptacle (27) contact associated stator pack connectors (20) and that further connector pins (30b) for external plug-in connection extend freely into the socket opening (32).

12. Vacuum cleaner blower of one or more of claims 1 to 11, characterized by the fact that the adaptor housing (31) may be inserted positively into the receptacle (27).

13. Vacuum cleaner blower of one or more of claims 1 to 12, characterized by the fact that the electrical components (28) on the circuit board (29) include a decoupling capacitor and a thermal switch for the suction blower drive motor (2).

14. Vacuum cleaner blower of one or more of claims 1 to 13, characterized by the fact that a hold down bracket (33) for the stator pack (6) is formed on the adaptor housing (31).

15. Vacuum cleaner blower of one or more of claims 1 to 14, characterized by the fact that the adaptor housing (31) consists of a lower housing portion (31a) for receiving the circuit board (29) and a lid portion (31b) linked to the lower housing portion (31a).

16. Vacuum cleaner blower of one or more of claims 1 to 15, characterized by the fact that the lid portion (31b) is flexibly linked to the lower housing portion (31a).

17. Vacuum cleaner blower of one or more of claims 1 to 16, characterized by the fact that the deflector (11) is centrically affixed to the flared rim (16).

18. Vacuum cleaner blower of one or more of claims 1 to 17, characterized by the fact that for the mutual alignment of support cage (10) and deflector (11) one or more positively interfitting centering guides (22) are formed in the flared rim (16) of the support cage (10) and in the marginal portion at the lower side of the deflector (11).

19. Vacuum cleaner blower of one or more of claims 1 to 18, characterized by the fact that the centering guides (22) are formed as pins, profiled protrusions, bores or the like.

20. Vacuum cleaner blower of one or more of claims 1 to 19, characterized by the fact that at the lower side of the deflector (11) the brush holder receptacles (17) of the support cage (17) serve as centering counter pieces for the centering guides (22).

21. Vacuum cleaner blower of one or more of claims 1 to 20, characterized by the fact that the centering guides (22) are formed as hold-down brackets for the brush holders (8).

22. Vacuum cleaner blower of one or more of claims 1 to 21, characterized by the fact that the centering pieces as hold-down brackets are of U-shaped configuration.

23. Vacuum cleaner blower of one or more of claims 1 to 22, characterized by the fact that the wound stator pack (6) is positively secured in the support cage (10).

24. Vacuum cleaner blower of one or more of claims 1 to 23, characterized by the fact that the support cage (10) is formed with support braces (24) and/or receptacles (25) positively complementing the contour of the stator, for the stator pack (6).

25. Vacuum cleaner blower of one or more of claims 1 to 24, characterized by the fact that the support cage (10) is formed with a support cage bottom (15) realizing suction air exits and for receiving a rotor bearing.

26. Vacuum cleaner blower of one or more of claims 1 to 25, characterized by the fact that at least the support cage (10) and the deflector (11) are made of a non-metallic material, especially plastic.

Abstract

Vacuum Cleaner Blower

In a vacuum cleaner blower (1) consisting of an electric drive motor (2) and a support cage (10) for receiving the structural modules of the drive motor such as stator pack (6), rotor (7) and brush holders (8) including carbon brushes (9) as well as an at least single stage blower unit driven by the motor including a deflector (11), impeller (12) and suction hood (4), the deflector being formed as a support cage lid including a bearing seat for the rotor (7) and the support cage (10) being formed for a mounting direction (C) of its structural modules in the axial direction of the blower and for direct contacting and the brush holder (8) of the carbon brushes being provided adjacent to the upper side (B) of the support cage which also faces the deflector (11). Because of this specialty, all structural modules essential for the electric motor aggregate such as stator pack, rotor, rotor bearing as well as brush holder including carbon brushes may for the completion of the suction blower be successively and fully automatically be inserted and secured in their proper disposition into the support cage (10), without additional fastening elements, in a preferred assembly and mounting direction (C). During mounting direct contacting of the electrical connectors of the stator (6) and carbon brushes (9) or brush holders (8) takes place as well without changing the assembly direction.

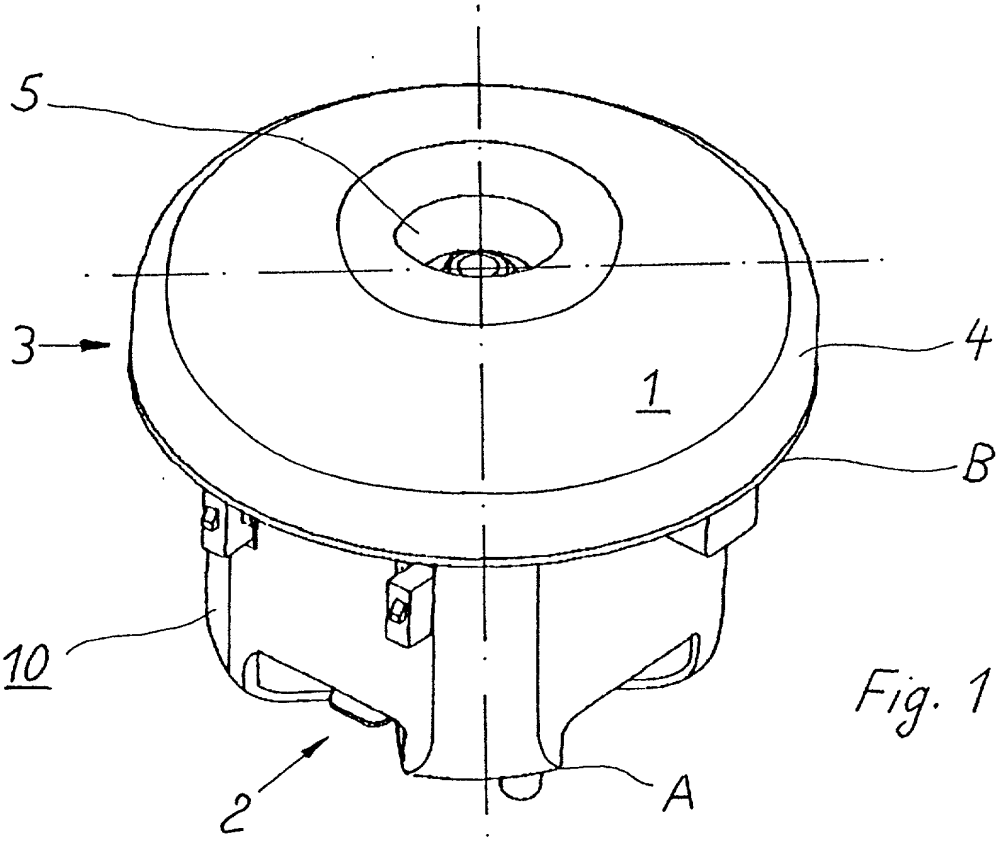


Fig. 1

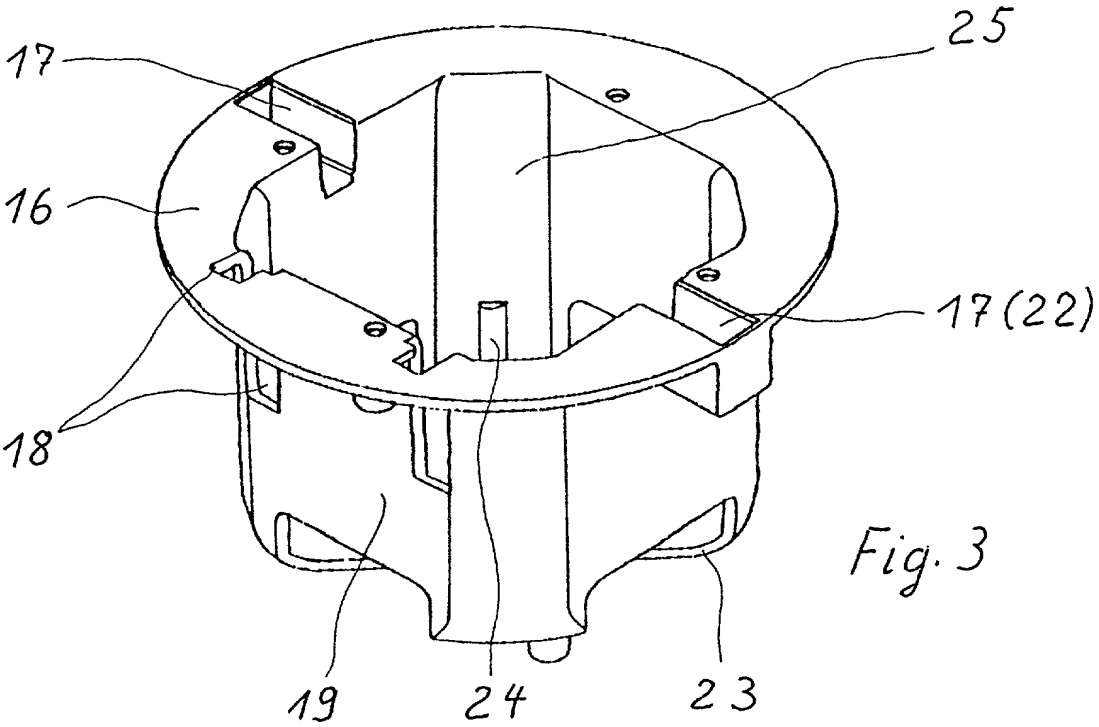
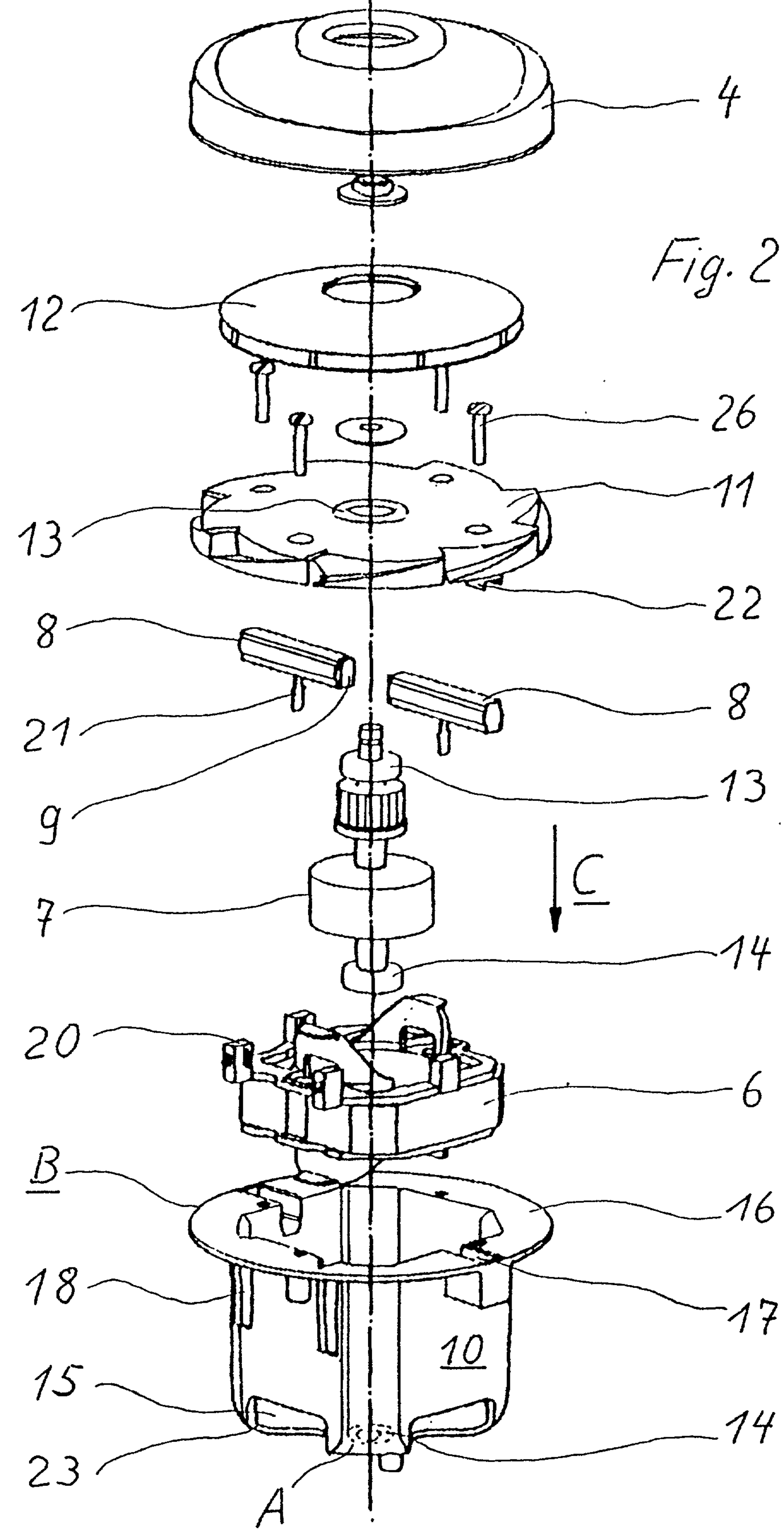


Fig. 3

Fig. 2



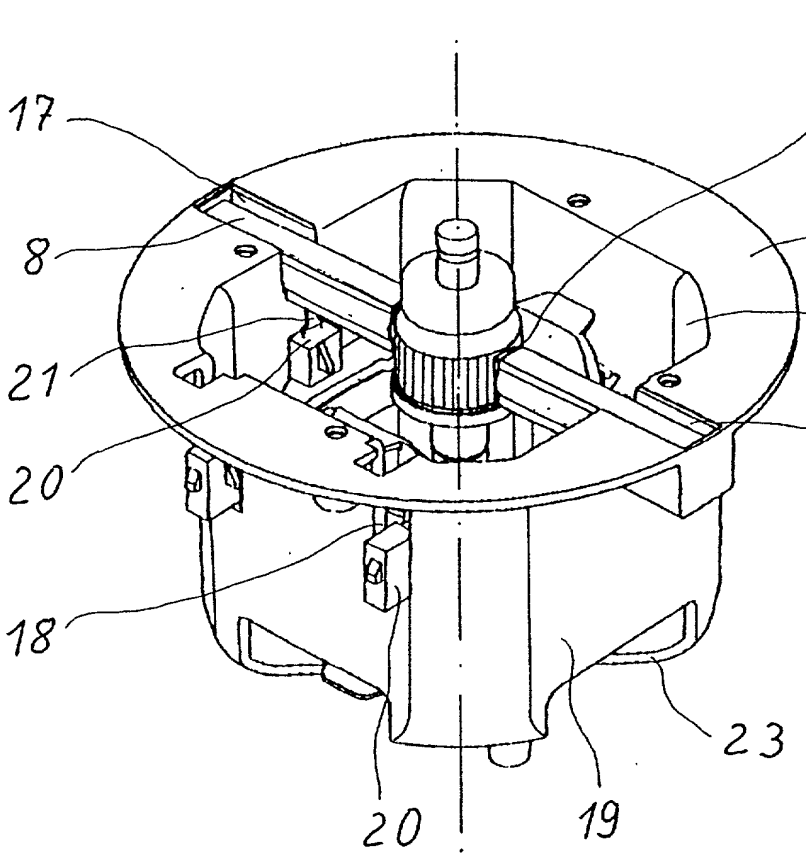


Fig. 4

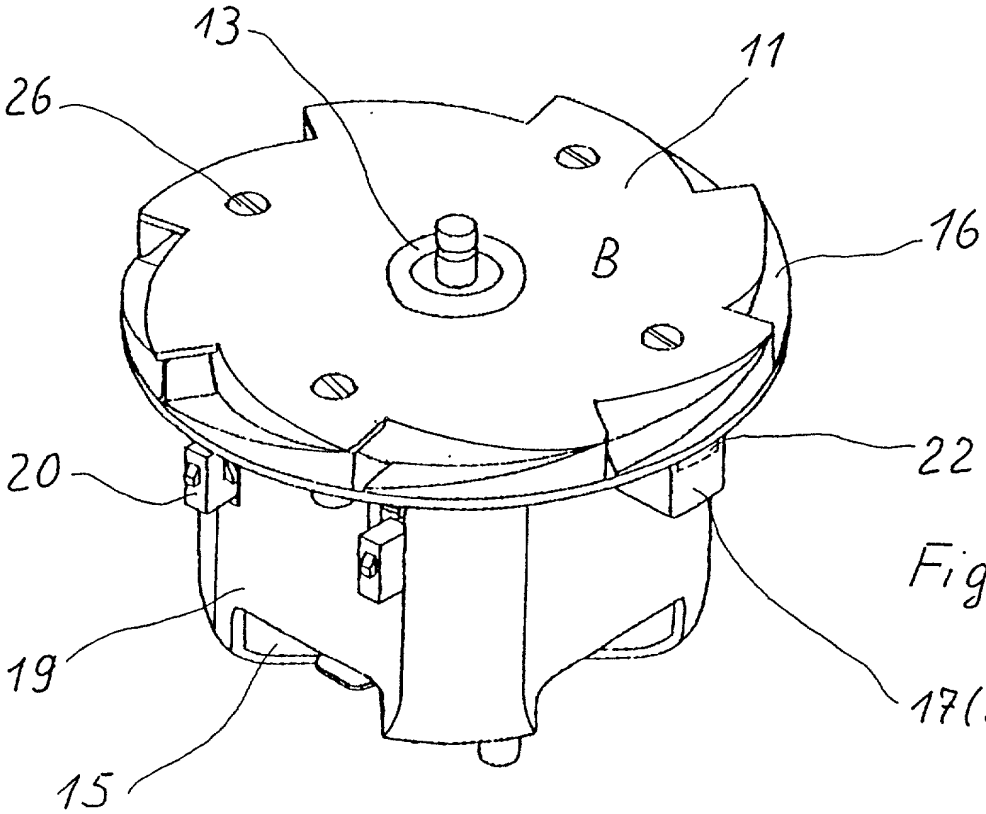


Fig. 5

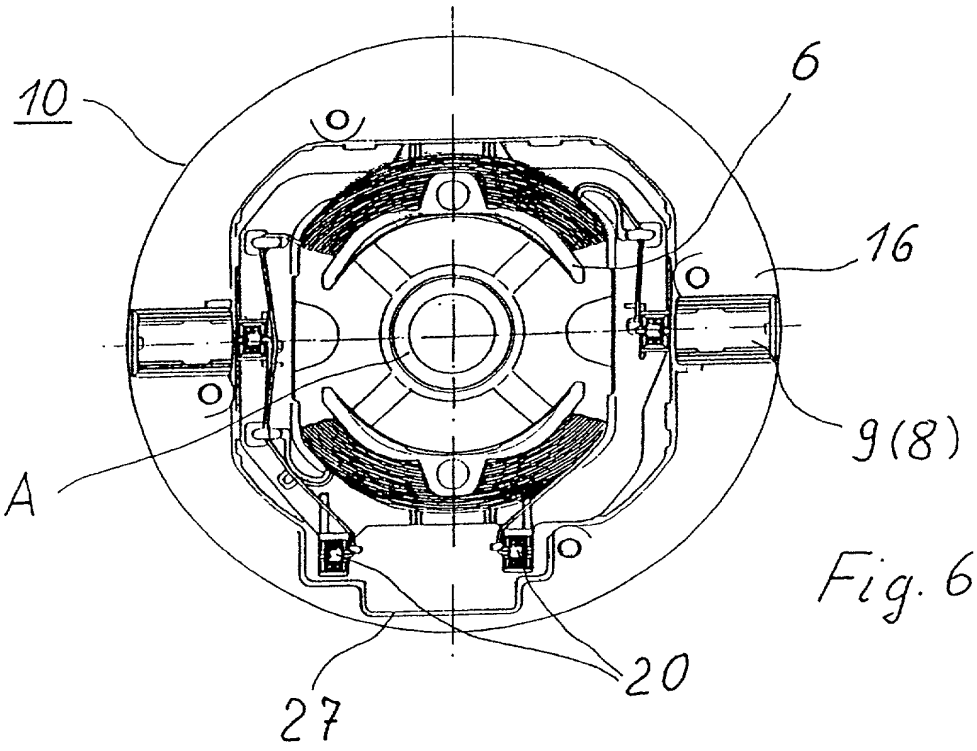


Fig. 6

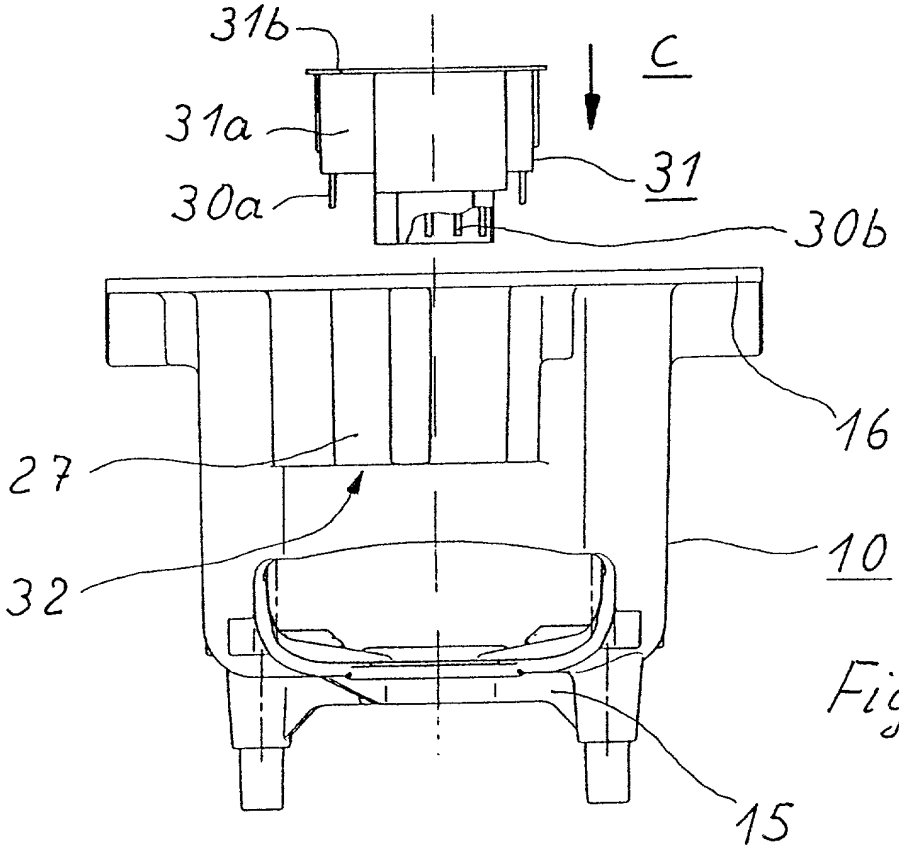


Fig. 7

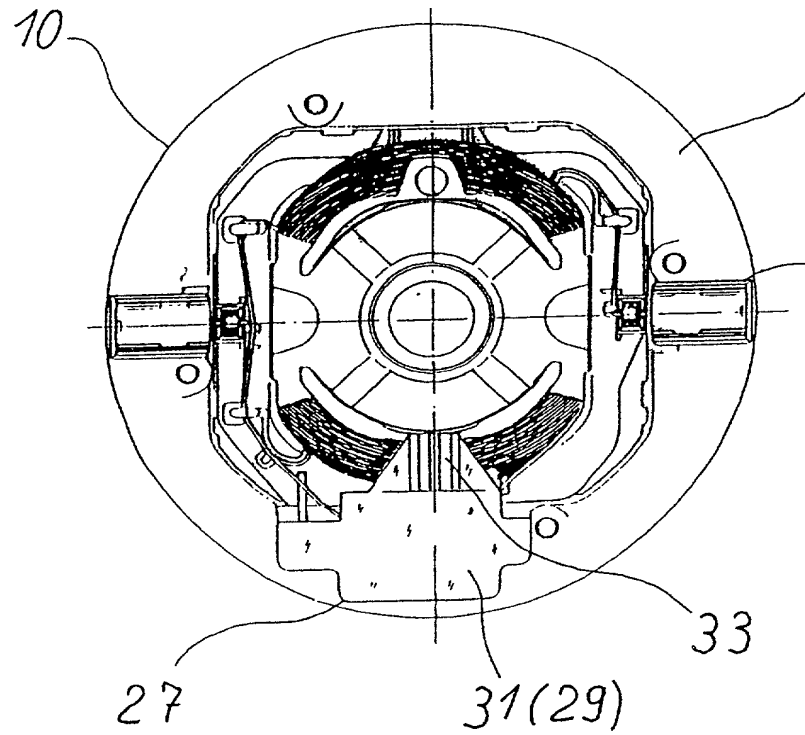


Fig. 8

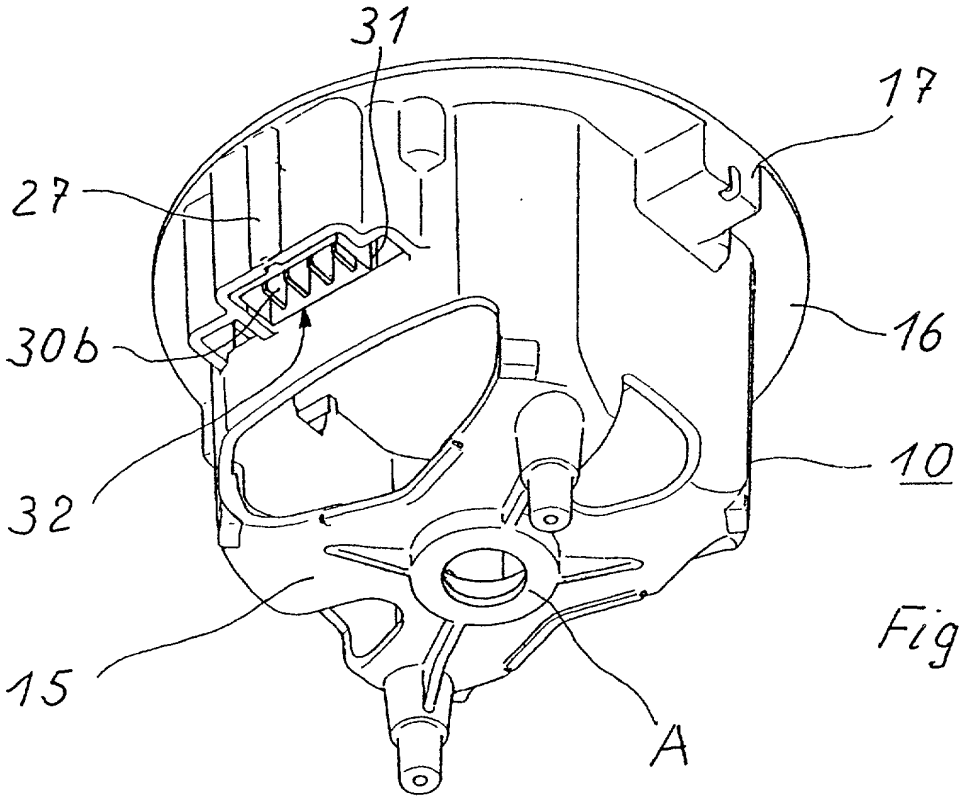


Fig. 9

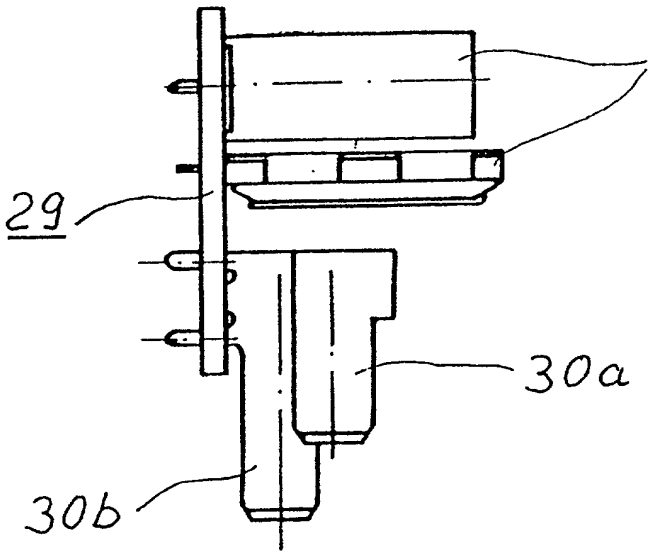


Fig. 10

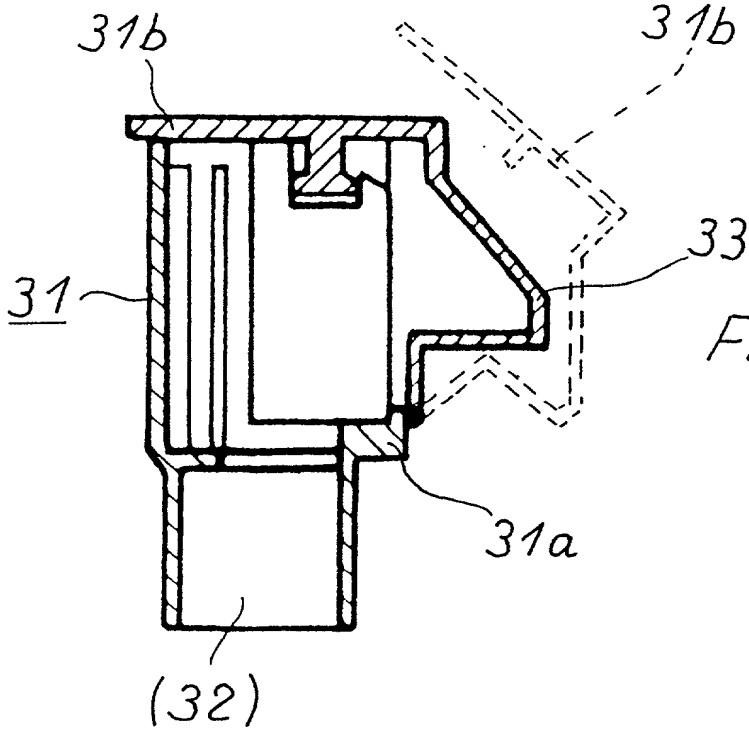


Fig. 11

Docket No.
000393

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Blower for a Vacuum Cleaner

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. or PCT International Application Number _____

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)			Priority Not Claimed
198 50 236.2	Germany	31 October 1998	☐
(Number)	(Country)	(Day/Month/Year Filed)	
			☐
(Number)	(Country)	(Day/Month/Year Filed)	
			☐
(Number)	(Country)	(Day/Month/Year Filed)	

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

N/A	
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)
(Application Serial No.)	(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

PCT/EP99/08099	27 October 1999	Pending
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status) (patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

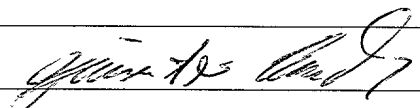
POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

1-00

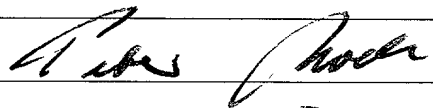
Karl Hormann, Esq., Registration No.: 26,470

Send Correspondence to: **Law Offices of Karl Hormann**
86 Sparks Street
Cambridge, MA 02138-2216

Direct Telephone Calls to: *(name and telephone number)*
Mr Hormann (617)-491-8867

Full name of sole or first inventor **ESCH, Guenter**
Sole or first inventor's signature  Date **22 May 2000**
Residence **Morsbach 53, D-53937 Schleiden, Germany** DEX
Citizenship **German**
Post Office Address **same as residence**

1-02

Full name of second inventor, if any **RODE, Peter**
Second inventor's signature  Date **22 May 2000**
Residence **Gladiolenweg 4, D-53881 Euskirchen, Germany** DEX
Citizenship **German**
Post Office Address **same as residence**

2-02

3-00

Full name of third inventor, if any **HEGEMANN< Hans-Joachim**
Third inventor's signature Hans Joachim Hegemann Date 22 May 2000
Residence **Im Tonrevier 18, D-53347 Alfter, Germany** DE
Citizenship **German**
Post Office Address **same as residence**

Full name of fourth inventor, if any **N/A**
Fourth inventor's signature Date
Residence
Citizenship
Post Office Address

Full name of fifth inventor, if any
Fifth inventor's signature Date
Residence
Citizenship
Post Office Address

Full name of sixth inventor, if any
Sixth inventor's signature Date
Residence
Citizenship
Post Office Address